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We claim:

1. A hydrogen storage container containing at least an hydrogen storage composition and hydrogen, the hydrogen including solid state hydrogen and gaseous hydrogen, the hydrogen storage composition including at least a portion of the solid state hydrogen and having an high equilibrium plateau pressure, wherein the solid state hydrogen defines at least 5% by weight of the total weight of the contained hydrogen, and wherein the gaseous hydrogen has a pressure greater than the high equilibrium plateau pressure and defines at least 5% by weight of the total weight of the contained hydrogen.

2. The hydrogen storage container as claimed in claim 1, wherein the gaseous hydrogen defines at least 15% by weight of the total weight of the contained hydrogen.

3. The hydrogen storage container as claimed in claim 2, wherein the gaseous hydrogen defines at least 19% by weight of the total weight of the contained hydrogen.

4. The hydrogen storage container as claimed in claim 3, wherein the gaseous hydrogen defines at least 28% by weight of the total weight of the contained hydrogen.

5. The hydrogen storage container as claimed is claim 4, wherein the gaseous hydrogen defines at least 50% by weight of the total weight of the contained hydrogen.

6. The hydrogen storage container as claimed in claim 1, wherein the gaseous hydrogen has a pressure of at least 248 bars.

7. The hydrogen storage container as claimed in claim 6, wherein the gaseous hydrogen has a pressure of at least 345 bars.

8. The hydrogen storage container as claimed in claim 7, wherein the gaseous hydrogen has a pressure of at least 690 bars.

9. The hydrogen storage container as claimed in claims 1 to 8, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of greater than 40 bars, and the gaseous hydrogen has a pressure greater than the equilibrium desorption plateau pressure.

10. The hydrogen storage container as claimed in claim 9, wherein the hydrogen storage material is a metalliferous material.

11. The hydrogen storage container as claimed in claim 10, wherein the metalliferous material is a metal hydride.

12. The hydrogen storage container as claimed in claim 11, wherein the metal hydride is in particulate form.

13. The hydrogen storage container as claimed in claim 9, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of greater than 80 bars, and the gaseous hydrogen has a pressure greater than the equilibrium desorption plateau pressure.

14. The hydrogen storage container as claimed in claim 13, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of less than 120 barss.

15. The hydrogen storage container as claimed in claim 14, wherein the hydrogen storage material is a metalliferous material.

16. The hydrogen storage container as claimed in claim 15, wherein the metalliferous material is a metal hydride.

17. The hydrogen storage container as claimed in claim 16, wherein the metal hydride is in particulate form.

18. The hydrogen storage container is claimed in claim 14, wherein the gaseous hydrogen defines at least 50% by weight of the total weight of the contained hydrogen and has a pressure of at least 345 bars.

19. A system for converting chemical energy stored in hydrogen into mechanical energy comprising:

a hydrogen storage container defining a storage space containing at least an hydrogen storage composition and hydrogen, the hydrogen including solid state hydrogen and gaseous hydrogen, the hydrogen storage composition including at least a portion of the solid state hydrogen and having an high equilibrium plateau pressure, wherein the gaseous hydrogen has a pressure greater than the high equilibrium plateau pressure; and

an engine fluidly coupled to the container for receiving the gaseous hydrogen, the engine being configured to effect conversion of the chemical energy stored in gaseous hydrogen delivered from the container to the engine into mechanical energy.

20. The system as claimed in claim 19, wherein the solid state hydrogen defines at least 5% by weight of the total weight of the contained hydrogen and the gaseous hydrogen defines at least 5% by weight of the total weight of the contained hydrogen.

21. The system as claimed in claim 20, wherein the gaseous hydrogen defines at least 15% by weight of the total weight of the contained hydrogen.

22. The system as claimed in claim 21, wherein the gaseous hydrogen defines at least 19% by weight of the total weight of the contained hydrogen.

23. The system as claimed in claim 22, wherein the gaseous hydrogen defines at least 28% by weight of the total weight of the contained hydrogen.

24. The system as claimed in claim 23, wherein the gaseous hydrogen defines at least 50% by weight of the total weight of the contained hydrogen.

25. The system as claimed in claim 19, wherein the gaseous hydrogen has a pressure of at least 248 bars.

26. The system as claimed in claim 25, wherein the gaseous hydrogen has a pressure of at least 345 bars.

27. The system as claimed in claim 26, wherein the gaseous hydrogen has a pressure of at least 690 bars.

28. The system as claimed in any of claims 19 to 27, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C greater than 40 bars, and the gaseous hydrogen has a pressure greater than the equilibrium desorption plateau pressure.

29. The system as claimed in claim 28, wherein the hydrogen storage composition is a metalliferous material.

30. The system as claimed in claim 29, wherein the metalliferous material is a metal hydride.

31. The system as claimed in claim 30, wherein the metal hydride is in particulate form.

32. The system as claimed in claim 31, wherein the engine includes a fuel cell.

33. The system as claimed in claim 28, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of greater than 80 bars, and the gaseous hydrogen has a pressure greater than the equilibrium plateau pressure.

34. The hydrogen storage container as claimed in claim 33, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of less than 120 bars.

35. The system as claimed in claim 34, wherein the hydrogen storage composition is a metalliferous material.

36. The system as claimed in claim 35, wherein the metalliferous material is a metal hydride.

37. The system as claimed in claim 36, wherein the metal hydride is in particulate form.

38. The system as claimed in claim 37, wherein the engine includes a fuel cell.

39. The system as claimed is claim 38, wherein the gaseous hydrogen defines at least 50% by weight of the total weight of the contained hydrogen and has a pressure of at least 345 bars.

40. A system for converting chemical energy stored in hydrogen into mechanical energy comprising:

a hydrogen storage container containing at least an hydrogen storage composition and hydrogen, the hydrogen including solid state hydrogen and gaseous hydrogen, the hydrogen storage composition including at least a portion of the solid state hydrogen and having an equilibrium desorption plateau pressure at 20°C of greater than 40 bars, wherein the gaseous hydrogen has a pressure greater than the equilibrium desorption plateau pressure of the hydrogen storage composition; and

a fuel cell fluidly coupled to the container for receiving the gaseous hydrogen.

41. The system as claimed in claim 38, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of greater than 80 bars.

42. The hydrogen storage container as claimed in claim 40, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of less than 120 bars.

43. The system as claimed in any of claims 40 to 42, wherein the hydrogen storage composition is a metalliferous material.

44. The system as claimed in claim 43, wherein the hydrogen storage composition is a metal hydride.

45. The system as claimed in claim 44, wherein the solid state hydrogen defines at least 5% by weight of the total weight of the contained hydrogen and the gaseous hydrogen defines at least 5% by weight of the total weight of the contained hydrogen.

46. A system for converting chemical energy stored in hydrogen into mechanical energy comprising:

a hydrogen storage container containing at least an hydrogen storage composition and hydrogen, the hydrogen including solid state hydrogen and gaseous hydrogen, the hydrogen storage composition including at least a portion of the solid state hydrogen and having an equilibrium desorption plateau pressure at 20°C of greater than 40 bars, wherein the gaseous hydrogen has a pressure greater than the equilibrium desorption plateau pressure of the hydrogen storage composition; and

a vehicular engine fluidly coupled to the container for receiving the gaseous hydrogen.

47. The system as claimed in claim 46, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of greater than 80 bars.

48. The hydrogen storage container as claimed in claim 47, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of less than 120 bars.

49. The system as claimed in any of claims 46 to 48, wherein the hydrogen storage composition is a metalliferous material.

50. The system as claimed in claim 49, wherein the hydrogen storage composition is a metal hydride.

51. The system as claimed in claim 50, wherein the solid state hydrogen defines at least 5% by weight of the total weight of the contained hydrogen and the gaseous hydrogen defines at least 5% by weight of the total weight of the contained hydrogen.

52. A method of effecting hydrogenation of a hydrogen storage composition disposed in a container space defined by a hydrogen storage container configured for containing at least hydrogen and the hydrogen storage composition, the hydrogen storage composition having an high equilibrium plateau pressure, comprising the step of:

flowing gaseous hydrogen into the container space so as to effect hydrogenation of the hydrogen storage composition at least until the hydrogen storage composition includes solid state hydrogen and the solid state hydrogen defines at least 5% by weight of the total weight of hydrogen disposed within the container space, and so as to effect filling of the container space with the gaseous hydrogen at least until the gaseous hydrogen disposed within the container space defines at least 5% by weight of the total weight of the hydrogen disposed within the container space.

53. The method as claimed in claims 52, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of greater than 40 bars, and the filling of the container space with the gaseous hydrogen is effected until the gaseous hydrogen

disposed in the container space has a pressure greater than the equilibrium desorption plateau pressure.

54. The method as claimed in claim 53, wherein the hydrogen storage material is a metalliferous material.

55. The method as claimed in claim 54, wherein the metalliferous material is a metal hydride.

56. The method as claimed in claim 55, wherein the metal hydride is in particulate form.

57. The method as claimed in claim 52, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of greater than 80 bars, and the filling of the container space with the gaseous hydrogen is effected until the gaseous hydrogen disposed in the container space has a pressure greater than the equilibrium desorption plateau pressure.

58. The hydrogen storage container as claimed in claim 57, wherein the hydrogen storage composition has an equilibrium desorption plateau pressure at 20°C of less than 120 bars.

59. The method as claimed in claim 58, wherein the hydrogen storage material is a metalliferous material.

60. The hydrogen storage container as claimed in claim 59, wherein the metalliferous material is a metal hydride.

61. The hydrogen storage container as claimed in claim 60, wherein the metal hydride is in particulate form.